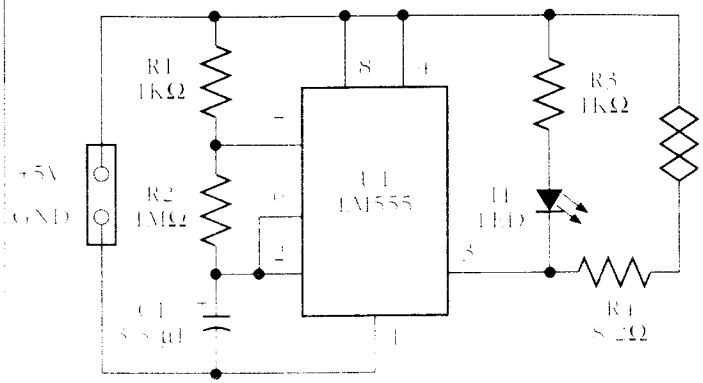
A Simple Oscillator Circuit



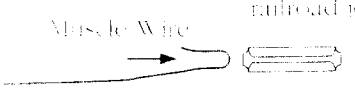
R1, R2 and C1 set the oscillation rate (~6 cycles minute).

Resistor R4 limits the current through *Muscle Wire* AA1 and thereby controls the heating rate.

Crimps

The heat from soldering or welding can damage a *Muscle Wire*'s unique crystal structure, so use crimps or other connectors to secure them.

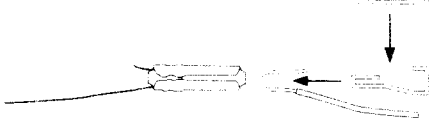
STEP 1 Crimp (N-scale railroad joiner)



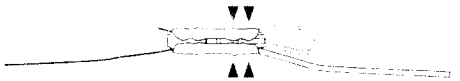
Bend wire and insert into connector

STEP 2 Crush with pliers or cutters

OPTIONS Staple

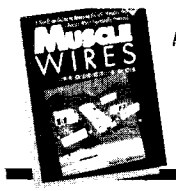


Thin conductive wire



Add a bent staple to make a solid end anchor point.

Add a thin conductive wire for an electrical connection.



Muscle Wires Project Book - 3rd Edition

Flexinol Muscle Wires Properties

Adapted from: Muscle Wires Project Book, 3rd Edition

	Flexinol Wire Name	037	050	100	150	250	300	375
PHYSICAL	Wire Diameter (mm)	.37	.50	1.00	1.50	2.50	3.00	3.75
	Min. Bend Radius (mm)	1.9	2.5	5	7.5	12.5	15	18.75
	Wire Cross-sectional Area (mm²)	1.075	1.963	7.85	17.663	49.063	70.650	110.400
ELECTRICAL	Linear Resistance (Ω/m)	50	32.0	8.0	3.5	1.3	1.0	.8
	Recommended Current (mA)	450	700	1,400	2,100	3,500	4,200	5,250
	Recommended Power* (W/m)	10	16	16	26	45	60	84
FORCE	Max. Recovery Force @ MPa (g)	190	190	190	190	190	190	190
	Rec. Recovery Force @ 190 MPa (g)	**20**	**35**	**150**	**330**	**930**	**1,250**	**2,000**
	Rec. Deformation Force @ 35 MPa (g)	**4**	**8**	**28**	**62**	**172**	**245**	**393**
SPEED								
Low Temp	Typical Contraction Speed (sec)	3	3	3	3	3	3	3
	LT Relaxation Speed (sec)	0.7	0.8	1.5	2.5	5	7.5	11.5
	LT Typical Cycle Rate (cycles/min)	12	11	9.5	8	6	5	4
High Temp	Typical Contraction Speed (sec)	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	HT Relaxation Speed (sec)	0.3	0.4	0.7	1.5	4.1	6.2	11.5
	HT Typical Cycle Rate (cycles/min)	108	67	53	38	25	18	9

		LT Wire	*HT Wire*
THERMAL	Activation Start Temp (°C)	55	88
	Activation Finish Temp (°C)	70	98
	Relaxation Start Temp (°C)	52	72
	Relaxation Finish Temp (°C)	42	62
	Annealing Temp (°C)	500	500
	Melting Temp (°C)	1,300	1,300
MATERIAL	Alloy	Ni-Ti (55.8% Nickel)	
	Resistivity (µΩ-m)	1	82
	Density (g/cm³)	6.5	6.5
	Magnetic Susceptibility (emu/g)	2	2
	Thermal Conductivity (W/m-°C)	18	18
	Density (g/cm³)	6.5	
	Specific Heat (cal/g-°C)	0.20	
	Latent Heat (cal/g)	6	
	Max. Cyclic Recovery Force (MPa)	70	Approx. 1/2 of LT Wire
	Max. Static Recovery Force (MPa)	200	Approx. 1/2 of LT Wire
	Max. Cyclic Deformation Force (MPa)	40	Approx. 1/2 of LT Wire
	Elastic Strain Limit (%)	4.5	Approx. 1/2 of LT Wire
	Work Output (J/cm³)	3	
	Fracture Elongation (%)	50	
	Young's Modulus (GPa)	75	
	Recommended Deformation (%)	3	

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